

REMARKS

The independent claims have been amended to specify that the polylactic acid, i.e., the plant derived resin, has a number average molecular weight of at least 30,000 and that the sodium oxide is 0.2% or less, as described in Figure 2.

Claims 1 and 7 were rejected under 35 U.S.C. §103 over Yamada. This rejection is respectfully traversed.

Rejected independent claim 1 relates to a flame-retardant thermoplastic resin composition in which 30-55.5% of a plant derived resin which is polylactic acid having a number average molecular weight of at least 30,000 is combined with 44 to 70% of a flame retardant of which 90% or more is composed of aluminum hydroxide containing 0.2% or less of sodium oxide impurity. Rejected dependent claim 7 recited that the composition also contains a high-strength fiber in a weight proportion of 10% by mass or less to the total mass of the flame-retardant thermoplastic resin composition.

The Yamada reference has been cited to show a flame retardant having an impurity level of 0.5% or less, and that the impurities present can include, among other materials, sodium oxide. There is no disclosure of an impurity level of 0.2% or less and the Declaration submitted previously establishes that the impurity level in the species actually disclosed in this reference was greater than 0.2%. Moreover, there is no disclosure that the sodium oxide is present in an amount of 0.2% or less, in that Yamada refers to the total amount of impurities and not the sodium oxide impurity level.

Despite this deficiency, it is asserted that Yamada teaches at a purity level of about 99.5% or more in order to improve shelf stability and that the impurity can be

sodium oxide. Applicants agree that this teaching would have motivated one skilled in the art to achieve a purity level of 99.5% in order to have an improved shelf stability but respectfully submit that the person skilled in the art would not have been motivated to make the purity 99.8% or more. There is nothing in the reference which suggests there is any advantage, and particularly an improvement in shelf stability, which can be realized by decreasing the impurity level from 0.5 to any particular lesser amount, whether that be 0.4 or, as in the claims, 0.2% or less. Given the difficulty and expense to further reduce the impurity level coupled with the lack of any advantage being realized, the skilled person would not undertake to make the impurity level 0.2% or less.

The Examiner previously acknowledged that the cost of purification would be a relevant consideration to the person skilled in the art. As pointed out in the Declaration of record, both the difficulty and cost of purification increases as the purity is increased beyond 99.5%. The Office Action does not suggest any reason to undertake the difficult and costly task of reducing the impurities beyond 0.5%, especially more than half that amount, when no advantage would be achieved relative to the shelf stability at 0.5%, and the art also does not provide a reasonable expectation of realizing any advantage. Applicants do recognize that the person skilled in the art would seek to obtain a balance between purification cost and shelf stability of the metal hydrate, but for the reasons just stated, it is submitted that the skilled person would expect that balance would have been realized at an impurity level of 0.5%. Even assuming for the sake of argument only, since the reference provides no basis for the assumption, that one would want to decrease impurities by another 50%, the impurity level would still be 0.25%, a level at which the Declaration shows does not realize the degree of fire

retardancy achieved by the invention. Nothing suggests that any advantage could be realized by reducing the impurity level by at least 60% to 0.2 % or less.

The Office Action observes that those skilled in the art know how to decrease the impurity content if they desire to do so. In response, applicants respectfully submit that the relevant question is not whether there is a capability to decrease impurity content but rather is there any reason to do so. Why would one do more than what was necessary unless there was some value to be realized. In the instant situation, there is no apparent value to do more than is necessary, which is to achieve an impurity level of 0.5%, give or take say 10% of that level.

Nothing in Yamada teaches or suggests that the number average molecular weight of the polylactic acid resin has any significance but the record shows that it does. The rejection is predicated on the assumption that there is a linear correlation between impurity content and shelf stability and under this assumption, the data set (concentration of alkali metal-base substance, number-average molecular weight) would exhibit a linear regression. However, the data presented in Figure 2 of the application shows that the assumption of a linear result is not valid. Instead, the Figure 2 data shows that there is an inflection point at a polylactic acid number-average molecular weight of 30,000 and impurity content of 0.2%. Compositions where the number average molecular weight is greater than 30,000 and the impurity content is 0.2% or less, demonstrate a superiority hydrolysis resistance. A greater than expected result is, of course, an evidentiary factor which is pertinent to the legal conclusion of obviousness. *In re Corkill*, 226 USPQ 1005 (Fed. Cir. 1985). The data set forth in Figure 2 shows that the results were greater than those which would have been expected from

the prior art to a non-obvious extent and results in a significant practical advantage. This evidence of unobvious and unexpected advantages relative to the prior art rebuts any assertion of *prima facie* obviousness. *In re Chupp*, 2 U.S.P.Q.2d 1437, 1439 (Fed. Cir. 1987).

Even beyond the foregoing, the application has another showing of unexpected results. Tables 1 and 3 - 10 and Figure 1 show that when the impurity level was 0.2% or less, the UL94 classification was either V1 or V0 but when the impurity level was greater than 0.2%, the rating was V2. Note that Example 16 of the reference has a rating of V2. The data shows that this dramatic change in flammability changed over a difference of only 0.02% alkali metal content (0.20% to 0.22%), and this is reflected in the drastic change in slope (inflection) between these data points in Figure 1. As pointed out in the Declaration paragraph 5, these results are not predictable and are surprising and unexpected. Indeed, there is no basis in the art for believing that reducing the impurity level would have this effect for polylactic acid resins whose number average molecular weight was at least 30,000. It is respectfully submitted that the rejection cannot be maintained in the face of this data and the sworn statement of unpredictability.

In light of the foregoing considerations, none of the other assertions made in the Office Action need be addressed.

Claims 2, 3, 4 and 8 were rejected under 35 U.S.C. §103 over Yamada in view of Yamamoto. These rejections are respectfully traversed.

Independent claims 2 and 3 include the features of claim 1 which has been shown to be patentable over Yamada above. Yamamoto has not been cited to cure any deficiency in Yamada, and in fact, does not do so. Accordingly, these claims are also patentable. In light of this fact, none of the other assertions made in the Office Action need be addressed.

Claims 6 and 20 were rejected under 35 U.S.C. §103 over Yamada in view of Shiping. This rejection is respectfully traversed.

These claims are dependent on claim 1 which has been shown to be patentable over Yamada above. Shiping has not been cited to cure any deficiency in Yamada, and in fact, does not do so. Accordingly, these claims are also patentable. Here also, none of the other assertions made in the Office Action need be addressed in light of this fact.

Claims 12-14 were rejected under 35 U.S.C. §103 over Yamada in view of Yamamoto and Shiping. This rejection is respectfully traversed.

These claims are dependent on claims 2 or 3 which have been shown to be patentable over Yamada above. Neither Shiping nor Yamamoto have has not been cited to cure any deficiency in Yamada, and in fact, does not do so. Accordingly, these claims are also patentable. In light of this fact, none of the other assertions made in the Office Action need be addressed.

In view of the above amendments and remarks, applicants believe the pending application is in condition for allowance and the early issuance of a Notice of Allowance is respectfully solicited.

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